

extremely misleading; it is difficult, for instance, to dissociate those physiological processes which are generally described as "voluntary" from having a physiological connection with "volition," and yet with volition as such physiology itself can have no dealings. In the opinion of the writer of the present review, Prof. Verworn is to be congratulated upon the firm attitude which he has taken and upon his timely attempt to demarcate the scientific frontier of his subject.

In the editorial preface reference is also made to a misconception which appears to be rather widespread, and is fundamental as regards clear definition of the subject; this is the tendency to regard general physiology as identical with what has been called comparative physiology. The latter phrase is undoubtedly a wholesome protest against the restriction as to experimental material which pervades a large section of physiological work, and which causes generalisations to be drawn from phenomena observed only in a few vertebrates—the frog, the rabbit, cat, dog and monkey. But comparative physiology as the appropriate *vis-à-vis* for the extensive science of comparative anatomy cannot at present be said to exist at all; on the other hand, there is a considerable and rapidly accumulating mass of material for general physiology in the sense in which this phrase is used by Prof. Verworn. It is true that both studies postulate investigations carried out upon an extensive range of living material; there is, however, a very real distinction between them related to the end for which the study is undertaken. If this is directed so as to ascertain the phenomena exhibited by a particular animal as such, then it fits forms part of comparative physiology; but if it is undertaken with the object of throwing light upon analogous phenomena existing throughout widespread groups of organisms, then it can be more appropriately described as pertaining to general physiology. In this latter case the object of study is selected because it exhibits some particular physiological process in an especially striking way or under especially modified conditions. The distinction will no doubt break down as our knowledge widens and a real comparative physiology comes into being, but at present it appears to be both sound and useful. In illustration of such practical utility the writer of this article draws attention to investigations upon the phenomena exhibited by the electrical organs of fishes; these have been undertaken by physiologists in order to throw light upon the electrical changes present in such excitable tissues as muscles, nerves, &c.; it is a mere incident that they also contribute towards our knowledge of the life-history of particular forms of fish. In this connection it is desirable to explain that the editor is particularly careful to guard against giving the impression that he attaches particular value to the study of the simplest forms of life; these are extremely suitable objects of study for particular purposes but he rightly ridicules the notion of there being any special virtue in a "Protistenphysiologie."

It will be clear from the above review that a very wide scope is given to the possible subject-matter of the new journal; it includes a wealth of material if only in investigations upon all the excitable tissues both animal and vegetable. The editor's hope is to bring together, by means of the *Zeitschrift*, widely scattered researches upon most diverse objects, which will, however, all be linked through their authors' aims and points of view; the whole assemblage will thus have a direct bearing in regard to those large problems of the existence of which every physiologist is aware.

In order to encourage the advance of physiology along these lines Prof. Verworn announces his intention of giving the new journal an international character, partly by publishing at the end of each number reviews of such researches appearing in various existing periodicals as come within the scope of the subject, but mainly by undertaking to print communications in any one of the languages made official at the Physiological Congress held last year in Turin. There are at present very few journals in which physiological communications, whether German, French, English or Italian, can appear; a physiological *Zeitschrift* of this cosmopolitan character will prove to be a real boon, and will, if successful, bring into touch workers of different nationalities in a way which must be most beneficial for the advance of their science.

Space will not permit any extended reference to the researches contained in the first number of the new journal; it may, however, be said that as regards importance and varied interest they are excellent, and that Prof. Verworn is to be congratulated upon the subject-matter of his first volume. The communications include the following original publications:—"Zur Kenntnis der

Narkose," Hans Winterstein; "Neue Versuche zur Physiologie der Befruchtung," E. von Dungern; "Ueber die Reaktion des Blutserums der Wirbeltiere und die Reaktion der lebendigen Substanz im allgemeinen," H. Friedenthal; "Inanitionsercheinungen der Zelle," H. Wallengren.

There is, further, an article by Prof. Boruttau upon the older and the more modern conceptions as to the causation of nerve conduction, and reviews of various contributions to contemporary physiological and biological literature by a number of competent reviewers. The journal is well printed, and such plates as are present in this first volume are quite satisfactory. It is to be hoped that English contributions to general physiology may appear in some of the succeeding numbers; in the meantime, Prof. Verworn has the hearty good wishes of many English physiologists for the success of his undertaking. F. G.

INTERNATIONAL CONFERENCE ON WEATHER-SHOOTING.

IF anyone wishes to learn the history of the subject of the effect of gun firing on weather, he cannot do better than consult a most interesting and complete history, which has recently appeared as a publication of the Central Anstalt for Meteorology and Earth's Magnetism (year 1902, vol. xxxix., Vienna). The above-mentioned history is only one of several valuable articles contributed to this volume, all of which are connected with the same subject. In fact, the publication is an account of the international conference for experts on weather-shooting which took place in July last at Graz. It may be news to many people to learn that already three international and one Italian congresses have been held, and that anyone who was interested in the subject could have attended.

The congress in question was summoned to give, if possible, definite answers to two definite questions, namely, (1) Is weather-shooting effective or not? (2) If no final judgment can be given, what should be done in future and how should one proceed? In order to prepare those interested and about to attend the conference, three monographs were published and distributed a fortnight beforehand, bringing together the whole history of the subject up to that time; the methods, apparatus and arrangements of modern weather-shooting; and lastly, the criteria for judging the effect of weather-shooting and the application of the same to the numerous "effects" and "non-effects" as reported in previous congresses and publications. Each of these are printed in the present volume and are valuable contributions to the subject.

It would take too long to enter deeply into the details of the numerous meetings and discussions at the conference itself. It is of interest to state, however, that the distinguished director of the Vienna Central Anstalt of Meteorology and Earth's Magnetism, Herr Hofrath Prof. Dr. Pernter, was general reporter to the congress, and that at the end of the volume he sums up the conclusions of the conference. The first result, as he states, was that the effect of weather-shooting, based on expert evidence, appears not only—as the overwhelming majority of the opinions of experts showed—as doubtful, but as most doubtful and, indeed, improbable when all circumstances and different weights of opinions are considered.

The second main result, restricting ourselves only to two, was that the firing should not as yet be given up, but continued until it be proved that it has not the desired effect. It may be mentioned in conclusion that this publication is a model of what such a report should be, and those who have taken part in it are to be congratulated on the successful result of their labours.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—A statement of the needs of the University has been circulated by the Vice-Chancellor among members of congregation. Applied mechanics is one of the subjects for which an additional professorship is asked. Better endowment is asked for the professorship of human anatomy, the readership in pathology, the Sibthorpe professorship of rural economy (now suspended), the chairs of geology, zoology, physics and experimental philosophy, and the curatorship of the Pitt-Rivers

Museum. A large extension of the system of readerships and lectureships is asked for in natural science, archaeology and other subjects. The necessity of instituting and maintaining a laboratory for experimental research in the field of psychology is urged by several professors. The urgent needs of the University Museum, the Botanic Garden, the University Observatory and other departments of science at the present time involve a capital expenditure of about 30,000*l.* and an annual expenditure of 3050*l.*

CAMBRIDGE.—Mr. L. Doncaster and Mr. V. J. Woolley, of King's College, have been awarded Walsingham medals for their researches in biology. Mr. Doncaster wrote on hybridisation, Mr. Woolley on the effect upon a nerve of strong interrupted induced currents.

Twenty-three entrance scholarships and exhibitions in natural science have been awarded at the recent examinations held by ten colleges. For classics fifty-one awards were made, for mathematics thirty-seven, and for modern languages six.

DR. CHARLES PORTER, of the Public Health Hospital, Leith, has been appointed demonstrator in bacteriology at University College, Sheffield.

DR. G. S. PARKIN summarises in the *Times* the results of inquiry made at Oxford on behalf of the trustees of the Rhodes scholarship scheme to ascertain the conditions on which scholars will be admitted to the University and also the willingness of the individual colleges to receive the men selected. Almost all the colleges have already expressed their willingness to receive a certain number of the scholars annually. The *minimum* standard of admission to be kept in view by the trustees in making their selections is the ability to pass Responses. Dr. Parkin adds:—"As much weighty evidence has been placed before the trustees to show that in parts of the United States, and in many of the colonies, it was felt that the bequest would be made more useful and effective if scholars were accepted for post-graduate and research work, as well as for merely under-graduate standing, the colleges were asked to state their preference in this particular. The replies were varied—some colleges inclining distinctly towards men prepared for advanced study, if within moderate age limits—while some are ready to take in scholars of both classes."

SCIENTIFIC SERIAL.

Journal of Botany, December.—The article on a new *Senecio* hybrid, by Mr. Burbidge and Mr. Colgan, refers to a form found at Sorrento, Ireland, which is intermediate in character between the common ragwort, *Senecio Jacobaea*, and an introduced species, *Senecio cineraria*. Besides the illustrations, which do not furnish very definite proof, the authors bring forward more convincing evidence in favour of their view.—The notes published by Mr. Spencer Moore refer to *Salvia Russellii*, two species of *Barleria* and a recently founded species of *Amphoranthus*.—Mr. C. E. Salmon records the finding of *Althaea hirsuta* near Reigate and discusses the possibility of the plant being a native or an alien.—Mr. Wheldon and Mr. A. Wilson give the localities of some mosses and hepatics which have been discovered in west Lancashire since their previous list, published in 1901.—A list of Shropshire Sphagna is compiled by Mr. W. P. Hamilton.—The revised catalogue of British Marine Algae, with localities, compiled by Mr. Batters, is concluded in this number.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 11, 1902.—Abnormal Changes in some Lines in the Spectrum of Lithium. By Hugh Ramage, B.A., St. John's College, Cambridge. Communicated by Prof. G. D. Liveing, F.R.S.

The author has found that the wave-lengths of the lines belonging to the principal and the second subordinate series in the oxyhydrogen flame spectrum of lithium agree closely with

those given by Kayser and Runge for the lines in the arc spectrum, but, excepting the orange line, there are considerable differences between the lines of the first subordinate series. Beginning with the orange line and proceeding to the others in order, the differences found were 0.07, 0.70, 0.49, 0.39 and 0.28 unit, the wave-lengths of the flame lines being the greater. In view of these differences the author examined the arc spectrum in an arc struck in air and in another enclosed in a magnesia brick; the spectra of different parts of the outer flame and of the inner core of the arc were studied. He also examined the spark spectra with and without a Leyden jar in the secondary circuit. The conclusions are that the lines in the principal series appear to broaden and reverse normally. The lines in the second subordinate series do not reverse, but they broaden towards the less refrangible end of the spectrum and become diffuse on that side. The first line in the first subordinate series, $\lambda 6103.84$, broadens and reverses almost normally. The other lines in that series broaden more rapidly on the more refrangible side than on the other. The inner core of intense arcs, and the parts near the negative poles of weak arcs and sparks, give a broad reversed line with its centre about $\lambda 4602.4$, whilst the part near the positive poles in weak arcs, and the flame of the arc, give a sharp bright line, $\lambda 4603.07$, coincident with the lines in the spectra of the oxyhydrogen flame and uncondensed spark. The wave-lengths hitherto recorded for these diffuse lines would appear to be those of abnormal lines; the true lines are the sharp bright ones which occur, without complication, in the spectrum of lithium in the oxyhydrogen flame.

Entomological Society, December 3, 1902.—Canon Fowler, president, in the chair.—Mr. H. W. Andrews exhibited a male specimen of *Therioptectes lucidus*, from Chattenden, July, 1902. Colonel Yerbury took several females of this species at Nethy Bridge, N.B., in 1900, but there appears to be no record of the capture of the male. He also exhibited a male *Platychirus sticticus* and a female *Microdon devius* from Eltham and Shoreham (Kent) respectively; and three small dark examples of *Syrphus balteatus*, taken near Brockenhurst, where the form was not uncommon, in October, 1902.—Mr. M. Burr exhibited two species of *Phyllium* from Ceylon, sent by Mr. Green, *P. bioculatum*, Gray (= *erurifolium* Hann., and *scythe* Gray), which produces the flanged ova and is the commoner of the two, and *P. athanyus*, Westw., a scarce species with the less ornate ovum.—Mr. A. J. Chitty exhibited a box of insects, taken, between September 22 and October 7 last, from a decayed fence chiefly constructed of birch. The exhibit comprised about a hundred species, of which seventy-nine or eighty were Coleoptera. Four species of beetles mimicked the surroundings of lichen-covered bark, and one, *Acalles tribatus*, resembled buds.—Mr. R. Adkin exhibited a hybrid *Selenia bilunaria* \times *S. tetralunaria*, together with spring and summer examples of both species for comparison. The hybrid presented some of the markings of each of its parents, the crescentic blotch at the apex of the fore-wings and the band on the hind-wings closely following *tetralunaria*, but no trace of the dark spot usually so distinct on each of the wings of that species, especially in the summer emergence, was visible, while the "second line" of the fore-wings closely followed *bilunaria*. In colour it more nearly resembled that of the summer brood of *tetralunaria*.

Geological Society, December 3, 1902.—Prof. C. Lapworth, F.R.S., president, in the chair.—On some well-sections in Suffolk, by Mr. William Whitaker, F.R.S. Notes of thirty-one new wells have accumulated since 1895, some of them giving results which could not have been expected. A trial-boring for the Woodbridge Waterworks Company gave a depth of 133½ feet down to Eocene beds, and a thickness of Crag about double of any before observed in the neighbourhood. The author is not satisfied with any of the explanations which have been suggested. Two borings at Lowestoft show that Crag extends to a depth of 240 feet in one case and more than 200 feet in another, confirming estimates of Mr. Harmer and Mr. Clement Reid. In one of these, Chalk was reached at 475 feet. Three other wells in the neighbourhood confirm the great depth of the newer Tertiary strata. Sections are also given from the following places:—Boulge, Hitcham Street, Ipswich (corroborating the evidence for a deep channel filled with Drift given by the section at St. Peter's Quay, New Mill), Shotley, Stansfield and Brettenham Park. The last shows the greatest thickness of Drift recorded in the county, namely, 312 feet.—The cellular magnesian